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Amendments to the Claims

Please add new Claims 165-205, cancel Claims 45, 102, 120, and 151, and amend the remaining claims as follows:

41. (Currently Amended) A method of making a patterned semiconductor film, comprising the steps of:

a) ~~inkjet printing,~~ gravure printing, printing by offset lithography, or flexographic printing a solution comprising passivated semiconductor nanoparticles, a first cyclic Group IVA compound of the formula (1):

$$(AH_x)_n, \qquad (1)$$

where n is from 3 to 8, each of the n instances of x is independently 1 or 2, and each A in the formula is independently Si or Ge, ~~and/or a second cyclic Group IVA compound of the formula (2):~~

~~$$(AH_x)_m(AH_yR_{z-y})_p(ZR')_q, \qquad (2)$$~~

~~where (m + p + q) is from 3 to 12, each of the m instances of x is independently 0, 1 or 2, each of the p instances of y is independently 0, 1 or 2, each of the p instances of z is independently 0, 1 or 2, each of the p instances of (y + z) is independently 1 or 2, each of the q instances of w is independently 0 or 1, at least one of p and q is at least 1, each A in the formula (2) is independently Si or Ge, Z is selected from the group consisting of B, P and As, R' is R or H, and each R in the formula (2) is independently alkyl, $BH_sR''_{2-s}$, $PH_sR''_{2-s}$, $AsH_sR''_{2-s}$ or $AH_tR''_{3-t}$, where s is 0 to 2, t is 0 to 3, and R'' is alkyl or AH_3,~~ and a solvent in a pattern on a substrate; and

curing said printed pattern to form said patterned semiconductor film, wherein curing said printed pattern comprises irradiating said printed pattern~~, and said patterned semiconductor film comprises an array of lines having a width of from~~

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~~100 nm to 100 μm, a length of from 1 μm to 5000 μm, and a thickness of from 0.01 μm to 1000 μm~~.

42. (Canceled)

43. (Currently Amended) The method of Claim 41, wherein said semiconductor nanoparticles comprise ~~further comprising~~ soluble passivated semiconductor nanoparticles.

44. (Previously Presented) The method of Claim 43, wherein said soluble passivated semiconductor nanoparticles comprise soluble passivated silicon nanoparticles.

45. (Canceled)

46. (Previously Presented) The method of Claim 41, wherein said curing step comprises sintering said printed pattern to form said patterned semiconductor film.

47. (Canceled)

48. (Canceled)

49. (Canceled)

50. (Canceled)

51. (Currently Amended) The method of Claim 41, ~~wherein said printing step~~ further ~~comprises~~ comprising selectively irradiating portions of said printed solution, and

removing either irradiated or non-irradiated portions of said printed solution to form said pattern.

52. (Canceled)

53. (Original) The method of Claim 51, wherein said selectively irradiating substep comprises (i) positioning at least one of said substrate and a mask such that said portions can be selectively irradiated and said non-irradiated portions cannot be irradiated, and (ii) irradiating said layer with ultraviolet light through said mask.

54. (Original) The method of Claim 53, wherein said printing step further comprises the substep of aligning said mask to an alignment mark on said substrate.

55. (Canceled)

56. (Currently Amended) The method of Claim [[41]] 166, wherein said printing step comprises inkjet printing said solution in said solvent in said pattern onto said substrate.

57. (Currently Amended) The method of Claim [[41]] 166, wherein said printing step comprises gravure printing, offset lithography, or flexographic printing said solution in said solvent in said pattern onto said substrate.

58. (Previously Presented) The method of Claim 41, further comprising drying said solution and said substrate.

59. (Currently Amended) The method of Claim 43, wherein said curing step further comprises heating said pattern to a temperature of at least about 200 °C[[.]] to sinter said soluble passivated semiconductor nanoparticles ~~and~~ in said pattern.

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60. (Previously Presented) The method of Claim 41, wherein said curing step further comprises placing said substrate into a chamber, and evacuating said chamber.

61. (Original) The method of Claim 60, wherein said curing step further comprises passing an inert and/or reducing gas into said chamber.

62. (Currently Amended) The method of Claim 41, wherein said pattern comprises lines ~~have~~ having a width of from 0.5 to 50 μm.

63. (Original) The method of Claim 62, wherein said lines have an inter-line spacing of from 100 nm to 100 μm.

64. (Previously Presented) The method of Claim 62, wherein said lines have a length of from 2 μm to 2000 μm.

65. (Previously Presented) The method of Claim 62, wherein said lines have a thickness of from 0.01 μm to 500 μm.

66-95. (Canceled)

96. (Previously Presented) The method of Claim 43, wherein said soluble passivated semiconductor nanoparticles comprise silicon nanoparticles and a passivation layer thereon.

97. (Previously Presented) The method of Claim 96, wherein said passivation layer comprises at least one member selected from the group consisting of an alcohol, an alcoholate, a thiol, a thiolate, an AR'_3 group, an alkyl group, an aryl group, and an aralkyl group.

98. (Previously Presented) The method of Claim 96, wherein said passivation layer comprises hydrogen atoms.

99. (Previously Presented) The method of Claim 96, wherein said passivation layer further comprises a surfactant.

100. (Previously Presented) The method of Claim 43, wherein said soluble passivated semiconductor nanoparticles have an average particle diameter of less than 5 nm.

101. (Previously Presented) The method of Claim 43, wherein said soluble passivated semiconductor nanoparticles have a particle size distribution of from 0.2 nm to less than 10 nm.

102. (Canceled)

103. (Currently Amended) The method of Claim [[102]] 41, wherein each x in the formula (1) is 2.

104. (Currently Amended) The method of Claim [[102]] 41, wherein each A in the formula (1) is Si.

105. (Currently Amended) The method of Claim [[102]] 41, wherein n is 5.

106. (Previously Presented) The method of Claim 103, wherein each A in the formula (1) is Si.

107. (Previously Presented) The method of Claim 103, wherein n is 5.

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108. (Previously Presented) The method of Claim 106, wherein n is 5.

109. (Previously Presented) The method of Claim 41, wherein the solution consists essentially of said passivated semiconductor nanoparticles, said first cyclic Group IVA compound and said solvent.

110. (Currently Amended) The method of Claim 43, wherein the solution consists essentially of said soluble passivated semiconductor nanoparticles, said first ~~and/or second~~ cyclic Group IVA compound[[s]], and said solvent.

111. (Currently Amended) The method of Claim [[41]] 165, ~~wherein the solution comprises said first and second cyclic Group IVA compounds,~~ wherein p is 0 or 1, q is at least 1, (z - y) is 0, and Z is B or P.

112. (Previously Presented) The method of Claim 111, wherein R' in the formula (2) is alkyl.

113. (Currently Amended) The method of Claim 41, wherein said solution further comprises a compound of the formula $(ZH_nR_{3-u})_k$, where Z is selected from the group consisting of B, P and As, u is an integer of from 0 to 3, k is 1 or 2, and each R is ~~the same as for the second cyclic Group IVA compound~~independently alkyl, $BH_sR''_{2-s}$, $PH_sR''_{2-s}$, $AsH_sR''_{2-s}$ or $AH_tR''_{3-t}$, where s is 0 to 2, t is 0 to 3, and R" is alkyl or AH_3.

114. (Currently Amended) The method of Claim 113, wherein R in the formula $(ZH_uR_{3-u})_k$ is H or AH_3, where A is ~~the same as for the second cyclic Group IVA compound~~Si or Ge.

115. (Previously Presented) The method of Claim 113, wherein u is 0 or 3.

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116. (Previously Presented) The method of Claim 41, wherein said first cyclic Group IVA compound is present in said solution in a percentage by weight of from 0.1% to 50%.

117. (Currently Amended) The method of Claim [[43]] 165, wherein said soluble passivated semiconductor nanoparticles, ~~and said at least one of~~ said first cyclic Group IVA compound and said second cyclic Group IVA compound are present in said ink in a percentage by weight of from 0.1% to 50%.

118. (Previously Presented) The method of Claim 41, wherein said solvent is aprotic.

119. (Previously Presented) The method of Claim 41, wherein said solvent is apolar.

120. (Canceled)

121. (Currently Amended) The method of Claim 118, wherein said solvent has a boiling point of less than 250 °C[[.]] at atmospheric pressure.

122. (Currently Amended) The method of Claim 121, wherein said solvent has a boiling point of less than 150 °C[[.]] at atmospheric pressure.

123. (Currently Amended) The method of Claim 118, wherein said solvent is selected from the group consisting of alkanes, ~~alkenes,~~ arenes, and cycloalkanes.

124. (Previously Presented) The method of Claim 41, wherein said solution further comprises one or more additives selected from the group consisting of a tension reducing agent, a surfactant, a thickening agent, and a binder.

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125. (Previously Presented) The method of Claim 59, wherein said sintering temperature is at least about 300 °C.

126. (Currently Amended) The method of Claim [[41]]166, wherein said curing further comprises heating said cyclic Group IVA compound(s) to a temperature of at least about 100 °C[[.]] to dry the printed solution~~, prior to irradiating said printed pattern~~.

127. (Previously Presented) The method of Claim 126, wherein said curing step further comprises sintering said dried, irradiated pattern to form said patterned semiconductor film.

128. (Previously Presented) The method of Claim 41, comprising gravure printing said solution in said solvent in said pattern onto said substrate.

129. (Previously Presented) The method of Claim 41, comprising printing said solution in said solvent in said pattern onto said substrate by offset lithography.

130. (Previously Presented) The method of Claim 41, comprising flexographic printing said solution in said solvent in said pattern onto said substrate.

131. (Currently Amended) The method of Claim [[41]] 166, wherein curing is conducted under conditions sufficient to form a doped or undoped ~~polysilane,~~ polygermane or germanium-substituted polysilane that is sufficiently insoluble and/or that has ~~having~~ a molecular weight sufficiently high ~~and/or a chemical composition sufficiently insoluble~~ to resist subsequent treatment with processing solvents.

132. (Currently Amended) The method of Claim [[102]] 41, wherein at least one of the n instances of A is Ge.

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133. (Currently Amended) The method of Claim 98, wherein said solution further comprises a surfactant.

134. (Previously Presented) The method of Claim 133, wherein the surfactant comprises a tri-C_1-C_{20} alkyl-substituted amine, a tri-C_1-C_{20} alkyl-substituted amine oxide, a tetra-C_1-C_{20} alkyl-substituted quaternary ammonium salt, a conventional betaine, a conventional sulfobetaine, a polyglycol of the formula H-(-OCH_2CH_2-)$_a$-OH (where $2 \leq a \leq 4$), a polyether of the formula R^3-(-OCH_2CH_2-)$_a$-OR^4 (where R^3 and R^4 are independently a C_1-C_4 alkyl group), a C_4-C_{20} branched or unbranched, saturated or unsaturated aliphatic carboxylic acid ester of a C_1-C_4 alcohol, a C_4-C_{20} aliphatic carboxylic acid thioester of a C_1-C_4 thiol, a tri-C_1-C_{20} alkyl- or triaryl-substituted phosphine, a tri-C_1-C_{20} alkyl- or triaryl-substituted phosphate, a di-C_1-C_{20} alkyl- or diaryl-substituted phosphate salt, an aryl or C_4-C_{20} branched or unbranched, saturated or unsaturated aliphatic sulfonic acid, an aryl or C_4-C_{20} branched or unbranched, saturated or unsaturated aliphatic sulfonate, a di-C_1-C_{20} alkyl sulfate, a C_1-C_{20} alkyl sulfate salt, a ketone of the formula $R^5(C{=}O)R^6$ (where R^5 and R^6 are independently a C_1-C_{20} alkyl or C_6-C_{10} aryl group), and/or a conventional silicone.

135. (Previously Presented) The method of Claim 44, wherein the silicon nanoparticles have an average diameter of less than 5 nm.

136. (Previously Presented) The method of Claim 135, wherein the silicon nanoparticles have an average diameter of less than 3.5 nm.

137. (Previously Presented) The method of Claim 44, wherein the silicon nanoparticles have a size distribution range such that at least 95% of the nanoparticles have an average particle diameter of from 0.1 nm to 10 nm.

138. (Previously Presented) The method of Claim 137, wherein the silicon nanoparticles have a size distribution range such that at least 98% of the nanoparticles have an average particle diameter from 0.5 nm to less than 5 nm.

139. (Previously Presented) The method of Claim 116, wherein the first cyclic Group IVA compound is present in the solution in a percentage by weight of from 0.5 to 30 wt.% .

140. (Previously Presented) The method of Claim 139, wherein the first cyclic Group IVA compound is present in the solution in a percentage by weight of from 1.0 to 20 wt.%.

141. (Previously Presented) The method of Claim 117, wherein the soluble passivated semiconductor nanoparticles and first and/or second cyclic Group IVA compound(s) are present in the solution in a percentage by weight of from 0.5 to 30 wt.%.

142. (Previously Presented) The method of Claim 117, wherein the soluble passivated semiconductor nanoparticles and the first and/or second cyclic Group IVA compounds are present in a weight ratio of from 0.1% to 90%.

143. (Previously Presented) The method of Claim 117, wherein the soluble passivated semiconductor nanoparticles and the first and/or second cyclic Group IVA compounds are present in a weight ratio of from 10% to 50%.

144. (Previously Amended) The method of Claim 41, wherein the solvent has a gas-phase dipole moment of about 2 debyes or less.

145. (Currently Amended) The method of Claim 144, wherein the solvent has a boiling point of about or less than 200 °C[[.]] at atmospheric pressure.

146. (Previously Presented) The method of Claim 41, wherein the solvent has a gas-phase dipole moment of about 0.5 debye or less.

147. (Currently Amended) The method of Claim 146, wherein the solvent has a boiling point of about or less than 150 °C[[.]] at atmospheric pressure.

148. (Previously Presented) The method of Claim 133, wherein the surfactant is present in the solution in an amount of from 0.05 wt.% to 0.5 wt.% of the composition.

149. (Previously Presented) The method of Claim 124, wherein the one or more additives are present in the solution in an amount of from 0.1 wt.% to 5 wt.%.

150. (Previously Presented) The method of Claim 41, wherein the substrate comprises a semiconductor wafer or a transparent or translucent display window with a two-dimensional array of fields thereon.

151. (Canceled)

152. (Previously Presented) The method of Claim 41, wherein the substrate comprises a glass or plastic window.

153. (Currently Amended) The method of Claim [[41]] 166, further comprising irradiating portions of the printed solution with light having a wavelength and/or intensity sufficient to oligomerize or polymerize the irradiated portions of the solution.

154. (Currently Amended) The method of Claim [[41]] 166, wherein the portions of the printed solution are irradiated with light sufficiently to convert irradiated cyclic Group IVA compounds to an insoluble polymer.

155. (Previously Presented) The method of Claim 41, further comprising removing solvent from the printed solution prior to curing.

156. (Previously Presented) The method of Claim 59, wherein said sintering temperature is at least 400 °C.

157. (Previously Presented) The method of Claim 41, further comprising cleaning the substrate with the patterned semiconductor film thereon.

158. (Previously Presented) The method of Claim 157, wherein cleaning comprises rinsing the substrate with or immersing the substrate in a cleaning solvent, draining the cleaning solvent from the substrate, and drying the substrate and patterned semiconductor thin film.

159. (Previously Presented) The method of Claim 157, wherein the cleaning solvent comprises a solvent in which the first cyclic Group IVA compound has a high solubility.

160. (Previously Presented) The method of Claim 62, wherein said lines have a width of from 1 μm to 20 μm.

161. (Previously Presented) The method of Claim 63, wherein said inter-line spacing is from 200 nm to 50 μm.

162. (Previously Presented) The method of Claim 161, wherein said inter-line spacing is from 500 nm to 10 μm.

163. (Previously Presented) The method of Claim 64, wherein said lines have a length of from 5 μm to 1000 μm.

164. (Previously Presented) The method of Claim 65, wherein said lines have a thickness of from 0.05 μm to 250 μm.

165. (New) The method of Claim 43, wherein said solution further comprises a second cyclic Group IVA compound of the formula (2):

$$(AH_x)_m(AH_yR_{z-y})_p(ZR')_q,$$

where (m + p + q) is from 3 to 12, each of the m instances of x is independently 0, 1 or 2, each of the p instances of y is independently 0, 1 or 2, each of the p instances of z is independently 0, 1 or 2, each of the p instances of (y + z) is independently 1 or 2, each of the q instances of w is independently 0 or 1, at least one of p and q is at least 1, each A in the formula (2) is independently Si or Ge, Z is selected from the group consisting of B, P and As, R' is R or H, and each R in the formula (2) is independently alkyl, $BH_sR"_{2-s}$, $PH_sR"_{2-s}$, $AsH_sR"_{2-s}$ or $AH_tR"_{3-t}$, where s is 0 to 2, t is 0 to 3, and R" is alkyl or AH_3.

166. (New) A method of making a patterned semiconductor film, comprising the steps of:

a) inkjet printing, gravure printing, printing by offset lithography, or flexographic printing a solution comprising passivated semiconductor nanoparticles, at least one cyclogermane of the formula $(GeH_x)_n$ or cyclosilagermane of the formula $(AH_x)_n$, where n is from 3 to 8, each of the n instances of x is independently 1 or 2, and at least one first instance of A is silicon and at least one second instance of A is germanium, and a solvent in a pattern on a substrate; and

b) curing said printed pattern to form said patterned semiconductor film, wherein curing said printed pattern comprises irradiating said printed pattern.

167. (New) The method of Claim 166, wherein said solution further comprises a cyclosilane of the formula $(SiH_x)_n$, wherein n and x are defined in Claim 166.

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168. (New) The method of Claim 166, comprising selectively irradiating portions of said printed solution, and removing either irradiated or non-irradiated portions of said printed solution to form said pattern.

169. (New) The method of Claim 166, further comprising drying said solution.

170. (New) The method of Claim 166, wherein said curing step comprises heating said pattern to a temperature of at least about 200 °C to sinter said passivated semiconductor nanoparticles in said pattern.

171. (New) The method of Claim 170, wherein said temperature is at least about 300 °C.

172. (New) The method of Claim 170, wherein said temperature is at least 400 °C.

173. (New) The method of Claim 166, wherein said passivated semiconductor nanoparticles comprise silicon nanoparticles and a passivation layer thereon.

174. (New) The method of Claim 166, wherein said passivated semiconductor nanoparticles comprise soluble passivated silicon nanoparticles.

175. (New) The method of Claim 173, wherein said passivation layer comprises at least one member selected from the group consisting of an alcohol, an alcoholate, a thiol, a thiolate, an AR'_3 group, an alkyl group, an aryl group, and an aralkyl group.

176. (New) The method of Claim 166, wherein said passivated semiconductor nanoparticles have an average particle diameter of less than 5 nm.

177. (New) The method of Claim 166, wherein said passivated semiconductor nanoparticles have a particle size distribution of from 0.2 nm to less than 10 nm.

178. (New) The method of Claim 166, wherein each x is 2.

179. (New) The method of Claim 166, wherein n is 5.

180. (New) The method of Claim 166, wherein said solution further comprises a compound of the formula $(ZH_uR_{3-u})_k$, where Z is selected from the group consisting of B, P and As, u is an integer of from 0 to 3, k is 1 or 2, and R is independently alkyl, $BH_sR"_{2-s}$, $PH_sR"_{2-s}$, $AsH_sR"_{2-s}$ or $AH_tR"_{3-t}$, where s is 0 to 2, t is 0 to 3, and R" is alkyl or AH_3.

181. (New) The method of Claim 180, wherein R in the formula $(ZH_uR_{3-u})_k$ is H or AH_3, where A is silicon and one of the instances of A is germanium.

182. (New) The method of Claim 180, wherein u is 0 or 3.

183. (New) The method of Claim 166, wherein said cyclogermane or cyclosilagermane is present in said solution in a percentage by weight of from 0.1% to 50%.

184. (New) The method of Claim 166, wherein the solution consists essentially of said passivated semiconductor nanoparticles, said cyclogermane or cyclosilagermane and said solvent.

185. (New) The method of Claim 166, wherein said solvent is aprotic.

186. (New) The method of Claim 166, wherein said solvent is apolar.

187. (New) The method of Claim 185, wherein said solvent has a boiling point of less than 250 °C at atmospheric pressure.

188. (New) The method of Claim 185, wherein said solvent has a boiling point of less than 150 °C at atmospheric pressure.

189. (New) The method of Claim 185, wherein said solvent is selected from the group consisting of alkanes, arenes, and cycloalkanes.

190. (New) The method of Claim 185, wherein the solvent has a gas-phase dipole moment of about 2 debyes or less.

191. (New) The method of Claim 185, wherein the solvent has a gas-phase dipole moment of about 0.5 debye or less.

192. (New) The method of Claim 174, wherein the silicon nanoparticles have a size distribution range such that at least 95% of the nanoparticles have an average particle diameter of from 0.1 nm to 10 nm.

193. (New) The method of Claim 192, wherein the silicon nanoparticles have a size distribution range such that at least 98% of the nanoparticles have an average particle diameter from 0.5 nm to less than 5 nm.

194. (New) The method of Claim 183, wherein said cyclogermane or cyclosilagermane is present in the solution in a percentage by weight of from 0.5 to 30 wt.% .

195. (New) The method of Claim 194, wherein the first cyclic Group IVA compound is present in the solution in a percentage by weight of from 1.0 to 20 wt.%.

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196. (New) The method of Claim 166, wherein the substrate comprises a semiconductor wafer or a transparent or translucent display window with a two-dimensional array of fields thereon.

197. (New) The method of Claim 166, wherein the substrate comprises a glass or plastic window.

198. (New) The method of Claim 166, further comprising removing the solvent from the printed solution prior to curing.

199. (New) The method of Claim 166, further comprising cleaning the substrate with the patterned semiconductor film thereon.

200. (New) The method of Claim 199, wherein cleaning comprises rinsing the substrate with or immersing the substrate in a cleaning solvent, draining the cleaning solvent from the substrate, and drying the substrate and patterned semiconductor thin film.

201. (New) The method of Claim 199, wherein the cleaning solvent comprises a solvent in which the cyclogermane or cyclosilagermane has a high solubility.

202. (New) The method of Claim 41, wherein said passivated semiconductor nanoparticles comprise semiconductor nanoparticles and a passivation layer thereon, said passivation layer comprises alkyl or aralkyl groups.

203. (New) The method of Claim 166, wherein said passivated semiconductor nanoparticles comprise semiconductor nanoparticles and a passivation layer thereon, said passivation layer comprises alkyl or aralkyl groups.

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204. (New) The method of Claim 41, further comprising irradiating said pattern after said printing and prior to said curing said printed patterned.

205. (New) The method of Claim 166, further comprising irradiating said pattern after said printing and prior to said curing said printed patterned.